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## AUTOCAD 2000: THE GOLD STANDARD OF DESIGN

AutoCAD 2000 is being hailed as the gold standard for design, and with good reason. Not only has Autodesk added a host of new features while improving ease of use and intuitiveness, it has also taken the lead in anticipating its users' future need to work more collaboratively within their own companies, and with customers, suppliers, and contractors.

Autodesk added functions and features to AutoCAD 2000 in two distinct areas: design environment and expanded reach. According to Daratech's survey of North American and European users, "Heads-up Design™" is hailed by users as an unqualified success, with its key components—Multiple Design Environment, DesignCenter™, Multiple Layouts, the Properties window, and AutoSnap™/AutoTracking—uniformly praised by almost all users Daratech surveyed. In addition, features meant to provide improved access and usability—the Properties window, Multiple Layouts and Dimension Enhancements—also received high marks.

On the other hand, functions and features that give AutoCAD 2000 "expanded reach"—Direct Web Access, Object Hyperlinks, ePlot, and DXF™ enhancement—were not as well received, mainly because they were less well understood. Fewer than half the users Daratech surveyed said they use the expanded reach functions; just under half also defined connectivity/interoperability as relatively or completely unimportant to them (or had no opinion at all). However, Daratech believes this is bound to change, as more and more users begin to understand the possibilities and benefits of using the functions and features of expanded reach.

It seems that Autodesk has moved ahead of its user base in this area, and its new slogan "AutoCAD 2000: Where Design Connects" may well take time to resonate with many AutoCAD users. Curiously, even among those users who stated that connectivity/interoperability is very important to them, few said they used the expanded reach features. This finding seems anomalous in an industry where interoperability is a rallying cry and connectivity to legacy data and in-house systems is said to be key.



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Daratech believes this seeming low level of interest in AutoCAD 2000 software's connectivity/interoperability features stems from the environments in which most of today's typical Autodesk® users work, where there is what can be described as a disjuncture between IT management, corporate reality, and CAD users. While IT management at many firms wants Internet features that connect their users to one another and to the world, often that management hasn't yet built the corporate infrastructure needed to put those features to full use, or hasn't yet extended them to its corps of in-house CAD users. Therefore, while AutoCAD users are ready for Internet features, and value interoperability/connectivity, they are not yet working in environments that support these features.

This is evidenced by interviewees who reported they are excited by AutoCAD 2000's expanded reach features but haven't really had cause to use them yet; in fact, many interviewees stated they hadn't used the expanded reach features but were excited—and confident—enough about their potential to predict the features would increase their productivity.

If the present CAD workplace doesn't always have robust, highly utilized Internet/intranet connectivity, however, the connectivity event horizon is bound to be extremely brief. As with all wired timeframes, it is not likely to take long for the expanded reach features offered by AutoCAD 2000 to be not only in regular use, but also indispensable to all AutoCAD users.

The Internet provides an apt analogy. Although many saw it as a narrow niche technology at its inception, this changed rapidly as users were exposed to and began to find uses for it that were never envisioned by its pioneers. Likewise, AutoCAD 2000 users in only partially connected environments may not yet fully understand all that is possible with the software's new technology, but this should not take long for them to discover, even through the kinds of casual, experimental engagement they report today.

This report evaluates user ratings of the overall performance, connectivity/interoperability, migration/integration, and key design environment and expanded reach features of AutoCAD 2000 both in absolute terms and comparatively, in terms of how much better or worse AutoCAD 2000 is compared to previous releases of AutoCAD (primarily AutoCAD Release 14).

This White Paper was based on in-depth telephone surveys with both domestic and international AutoCAD users at organizations selected at



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random. Users interviewed represent a wide cross-section of industries, such as building design and automotive, and disciplines, such as facilities CAD manager, drawing office manager, project engineer, drafting supervisor, and owner.

### SPEED, STABILITY, EASE OF USE

It seems clear that AutoCAD 2000 is faster, perhaps much faster than AutoCAD Release 14. 69% of respondents said it was faster, with 38.5% saying it was somewhat faster and 30.8% convinced it was much faster. No one surveyed said it was slower.

With respect to stability, a solid majority said it was as stable as or more stable than AutoCAD Release 14. Only 15.4% said it was somewhat less stable. This is a remarkable achievement considering that AutoCAD Release 14 is a mature product, while AutoCAD 2000 has just been released.

Ease of use is a subjective assessment and is very much influenced by what people are accustomed to. So it is quite a tribute to AutoCAD 2000's designers that more than half of the users surveyed—53.9%—reported it was easier to use (30.8% finding it much easier and 23.1% finding it somewhat easier), with 30.8% rating it as easy to use as previous versions and only 7.7% saying it was somewhat harder to use.

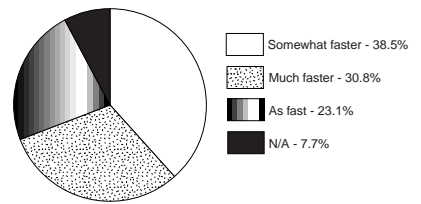
Users especially liked the context-sensitive menus and the context-sensitive right mouse button functions. AutoSnap/AutoTracking, new dialog boxes, new buttons at the bottom of the screen for status control, object tracking, the drawing assistant properties design center, object snaps, and the orbit and real time rendering also drew praise. On the other hand, some users were unhappy with "the lack of a transparent UCS," and with having to lean the software's new approach to plotting—"They've completely revised the way it plots, and we've already done some customization to make it easier." (Plotting will be addressed in depth below.)

### INTUITIVENESS AND FUN

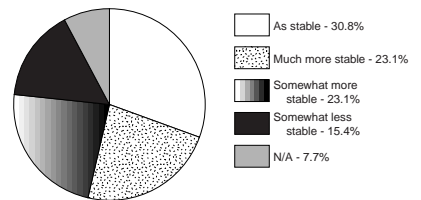
AutoCAD 2000 is intuitive for AutoCAD users, 61.5% of whom said it was very intuitive, and 38.5% of whom found it somewhat intuitive. No one surveyed said it was at all counter-intuitive.

Of note is that 84.6% of users surveyed found AutoCAD 2000 more fun to use than previous versions of AutoCAD. Most respondents were glad

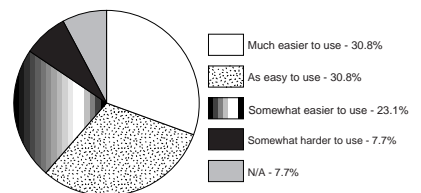
How would you rate AutoCAD 2000 on speed compared with AutoCAD R14?



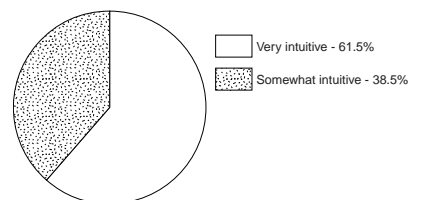
How would you rate AutoCAD 2000 on stability compared with AutoCAD Release 14?



How would you rate AutoCAD 2000 on ease of use compared with AutoCAD R14?



As an AutoCAD user, how intuitive is AutoCAD 2000 for you?





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to be asked about the fun factor, something not usually addressed in software evaluations.

Users named the following features as major factors in their fun ratings: 3D Orbit and improved overall 3D ("it's so much better"), hide or shade, the ability to work in other viewports and see updates, DesignCenter, MDE, Multiple Layouts, solids modeling, quick dimensioning ("it's semi-automatic—you can dimension the whole side of a drawing in three clicks"), and real time render orbit. Again, the improvements to 3D function were often noted: "The 3D rotation is a lot better. You can actually rotate in 3D, with the earlier version you had to use other packages to do that and now it is built-in." "I don't want to go back to Release 14," one user summed up.

### CUSTOMIZATION

Fewer than half of respondents (46.2%) mentioned enhanced customization, and 75% of these cited it as a way to alter AutoCAD 2000 features they did not feel comfortable with. Of course, long-time users become very accustomed to their particular customization, and dislike and avoid adjusting or transferring them to a new release. Therefore, these complaints about the need to customize or re-establish customization are bound to be made each time a new release is adopted, and are not specific to AutoCAD 2000.

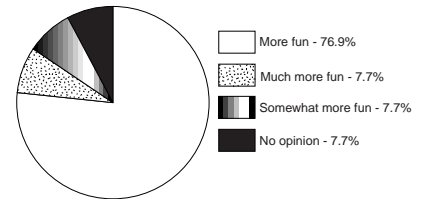
Indeed, while customization was cited as a "fix," customization tools were praised for being easy to use and intuitive: "It's so customizable. . . We're going to have trouble with cursor menus popping up all the time, but that's customizable."

Features cited by users as missing or imperfect were the lack of custom transportable toolbars, no access to ADIs, cursor menus, plotting difficulties, and having to re-program many custom menus and Visual LISP™ programs and commands created in previous versions of AutoCAD.

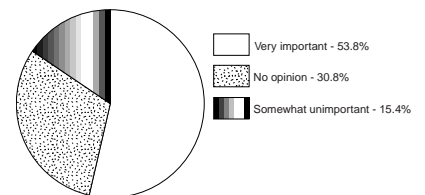
### CONNECTIVITY/INTEROPERABILITY

As discussed above, despite the general demand for connectivity to and interoperability with external and internal databases in the CAD/CAM, CAE industry, none of the AutoCAD 2000 users surveyed was using the connectivity/interoperability features to their fullest, and some were not using them at all.

*Is AutoCAD 2000 more fun to use than previous versions of AutoCAD?*



*Is connectivity/interoperability with external and internal databases important to you?*





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Again, Daratech believes this is because of the time lag between creation and full implementation of corporate infrastructures to support interoperable/connected workplaces for CAD users. It is not that users don't want this technology, but rather that they and often their companies haven't reached a point where they can implement it easily and intuitively. When they do get there, AutoCAD 2000 is ready for them.

Meanwhile, just over half (53.8%) of users surveyed said connectivity/interoperability is important to them, while 15.4% said it is somewhat unimportant and 30.8% had no opinion.

When asked which features improved connectivity/interoperability, 15.4% of respondents cited Visual LISP and 15.4% mentioned OLE. 15.4% liked the ActiveX improvements, and 7.7% liked VBA. 7.7% complained about the loss of DDE.

### INTEGRATION AND MIGRATION

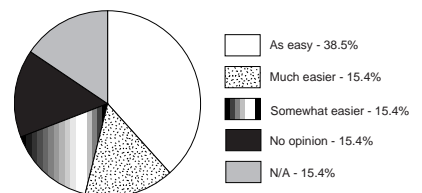
38.5% of users surveyed found integrating AutoCAD 2000 into their existing environments as easy as previous versions of AutoCAD, with 15.4% calling it much easier. No one found integration more difficult compared with previous versions of AutoCAD.

The fact that over half of users surveyed said their companies do not use AutoCAD 2000 in conjunction with other systems or databases seems to provide more evidence that typical users are not yet working in a fully interoperable/connective design environment. Those who are working in such an environment were positive about AutoCAD 2000, and rated the integration process for AutoCAD 2000 compared with previous versions of AutoCAD as about the same—"training time takes a little longer, but it's better at network support."

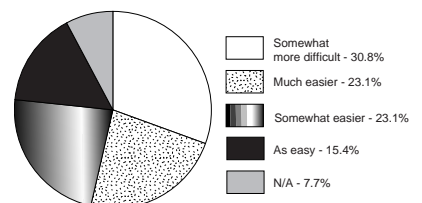
Migration to AutoCAD 2000 from previous versions of AutoCAD (primarily Release 14) received mixed ratings. 46.2% of users surveyed found it much or somewhat easier, 30.8% found it somewhat more difficult, and 15.4% found it as easy as migrating from previous versions.

Plotting is at the heart of the migration difficulty: 100% of those users who had trouble migrating said plotting was either one of or the only reason. Users who took the time (and, as they see it, the trouble) to learn the new plotting features did find plotting enhanced. But the majority of users surveyed did not want to take that time or trouble, and therefore had a negative reaction to the enhanced plotting features even while

How would you rate integrating AutoCAD 2000 compared with previous versions of AutoCAD?



How easy was it to migrate to AutoCAD 2000 compared with migrating from R13 to R14?





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acknowledging plotting capabilities have been improved. Indeed, those who had mastered the new plotting features were very pleased with the results.

Comments uniformly mentioned increased difficulty of migration as a by-product of the difficulty of learning the enhanced plotting functions: "The normal way of plotting is complicated unnecessarily. It takes a lot of configuring to set it up and takes even longer to get used to. You can do a lot more, but the transition takes awhile." "[Migrating to AutoCAD 2000 was difficult] just because of the plotting. Everything else was easier. I've spent more time migrating to AutoCAD 2000 [because of the plotting] than I did for all the other releases combined." "[The principal barrier to upgrading is] learning plotting. Other than that there were no migration problems." "The redesigned plotting functionality was more difficult. . . For something that's supposed to be easier to use, they shouldn't need a twenty-page document to [set it up]." "Since plotting is more functional, users have to do more work setting it up." "Depending on how familiar you are with Release 14, [migration] is not a problem. The biggest obstacle is plotting."

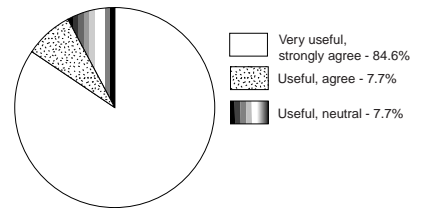
Again, however, users who had completed plotting migration were pleased with the results.

### MULTIPLE DOCUMENT ENVIRONMENT, DESIGNCENTER, PROPERTIES WINDOW, AUTOSNAP/AUTOTRACKING, AND MULTIPLE LAYOUTS

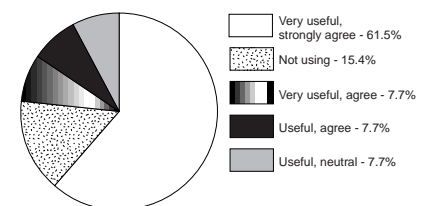
The Multiple Document Environment (MDE) is the first of the "Heads-up Design" features to win strong approval. All users surveyed were using MDE, and 84.6% found it very useful and strongly agreed it will increase their productivity; 15.4% found it useful, with half of those agreeing it will increase productivity and half neutral. The MDE was cited by many users as adding to the fun, ease of use, and productivity of AutoCAD 2000 software as a whole, and many users say this is the feature they have been waiting for—" [MDE] will add 5-10% to our productivity. I've wanted this feature for eight years."

DesignCenter is used by almost 85% of users surveyed, and 69.2% of those find it very useful, strongly agreeing or agreeing it will increase their productivity. "It's extremely useful. Being able to steal blocks from other drawings without opening them sure makes life very easy." Only 15.4% are not yet using DesignCenter.

How useful is MDE?  
Do you expect it will increase your productivity?



How useful is DesignCenter?  
Do you expect it will increase your productivity?





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The Properties window is used by just under 93% of users surveyed. 53.9% say it's very useful and strongly agree or agree it will increase their productivity, 30.8% say it's useful but are neutral on productivity. "Once the base drawings are set up, no further changes are necessary."

84.6% of users surveyed gave AutoSnap/AutoTracking the highest possible ratings. "It's tremendously productive. Anyone doing a large amount of editing will find a 25% increase in productivity."

Multiple Layouts are used by 61.5% of users surveyed, and 38.5% of those give it a high rating ("absolute, definite increase in productivity. Keeps all updates and changes together on one drawing and saves us a ton of time"). 7.7% say it is useful but are neutral on productivity, and 15.4% are neutral on both counts.

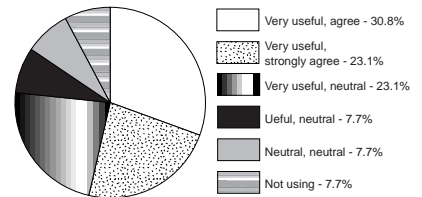
Some feature improvements users suggested were ease-of-control in editing sessions, BatchPlot, and PlotStamp in the next version of MDE, drag-and-drop hatch patterns, and bitmap, TIF, TGA, JPG, and GIF functionality incorporated into DesignCenter, "more control" in the Properties window ("there are a number of choices grayed out that could be made available"), the ability to snap to invisible objects in AutoSnap/AutoTracking, and the ability to see multiple layouts on screen at the same time and to copy and paste between them in Multiple Layouts.

Overall, these design features won high praise: "We re-use a lot of parts and assemblies, combining them into bigger parts and assemblies, and the fit-up is easier to control with the MDE. Copying elements from one drawing to another is also much easier. MDE has already made us more productive." "[MDE] will make us two to three times more productive." "I love the drag-and-drop dimension styles. . .[overall] DesignCenter is almost overwhelming." "It's a big time-saver to get rid of multiple picks. [AutoSnap/AutoTracking] was one of the biggest enhancements in Release 14 and now it's made even more intelligent in AutoCAD 2000." "I love PolarSnap™s!" "We don't use paper space yet but AutoCAD makes it so easy it's getting hard to avoid."

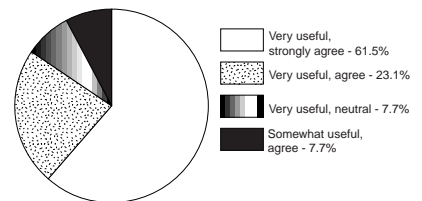
### DIRECT WEB ACCESS, OBJECT HYPERLINKS, ePLOT, AND DXF ENHANCEMENT

Direct Web Access is used by 30.8% of users surveyed; of these, 15.4% agree it will enhance productivity and 15.4% are neutral ("I can't really say how useful it will be because I've used it only limitedly, but it is powerful").

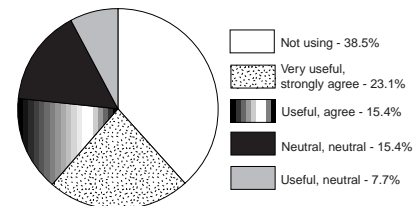
How useful is the Object Property Manager?  
Do you expect it will increase your productivity?



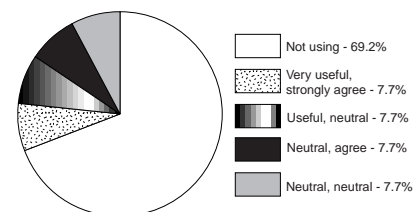
How useful is AutoSnaps/AutoTracking?  
Do you expect it will increase your productivity?



How useful is Multiple Layouts?  
Do you expect it will increase your productivity?



How useful is Integrated Web Access?  
Do you expect it will increase your productivity?





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Hyperlinks are also used by 30.8% of users surveyed, and of these 23.1% are neutral regarding productivity.

ePlot is used by 46.2% of users surveyed, with 30.8% finding it useful. Users who haven't yet had cause to use ePlot did feel optimistic about its eventual benefit ("we're just setting up our Web site, so we will use ePlot in the future").

23.1% of users surveyed are aware of improvements to AutoCAD 2000's DXF facilities. 7.7% strongly agree these will increase productivity ("it handles DXF better than any previous release"), and 15.4% are neutral.

Functionality that users feel is missing includes the ability to open DXF files with BatchPlot, which currently opens only DWG files, the ability to hyperlink to bookmarks in the HTML file and more options in the way bookmarks are stored, DXB support for ePlot ("they removed DXB support and it's driving people nuts"), and improved DWF format for ePlot ("the file format isn't suitable for 2D piping isometrics. Diagonal lines show up in the hyperlink as a big rectangle, rendering it useless. That's been a problem since Release 14").

Users who are tuned into the connected workplace are positive about AutoCAD 2000 software's connectivity/interoperability features—even if they aren't using them regularly. "[With Direct Web Access] I'll be able to get a sales guy to look at a drawing without having to fax it. That'll be great." "I'm excited about [Hyperlinks], but haven't had need [for it] yet." "The problem [with getting the full benefit of ePlot] is we have to implement the other end of that—Web site, etc."

These are telling comments that support Daratech's view that the typical AutoCAD workplace is approaching Internet/intranet/Web connectivity but has not achieved it yet. The good feelings generated by even tentative engagement with the connectivity/interoperability features in AutoCAD 2000 bode well for the product's ability to initiate or speed up this process at user organizations.

### COMPANY ADOPTION/INTEGRATION PLANS

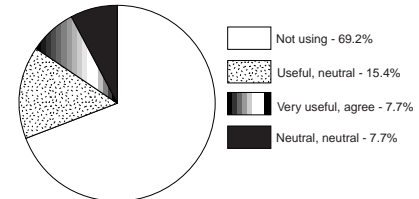
Impressively, 100% of respondents said their department/company planned to upgrade all or most of their AutoCAD users to AutoCAD 2000. 53.8% of users surveyed are planning to upgrade within 3 months, 30.7% within 6 months, and 15.4% within 12 months.

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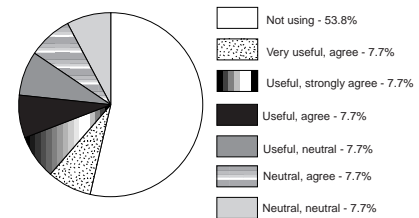
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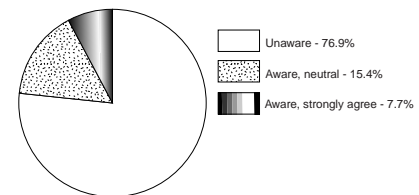
*How useful are Hyperlinks?  
Do you expect they will increase your productivity?*



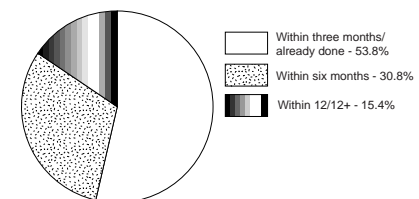
*How useful is ePlot?  
Do you expect it will increase your productivity?*



*Are you aware of DXF improvements in AutoCAD 2000?  
Do you expect they will increase your productivity?*



*At what rate are you planning to upgrade everyone  
at your company to AutoCAD 2000?*





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The principal barrier to adopting AutoCAD 2000 and upgrading AutoCAD users is budget constraint; almost half of users surveyed said “convincing the CFO/accountant to buy” was the major hurdle. Other barriers were training time, plotting migration, and network compatibility.

### DARATECH'S RECOMMENDATIONS

The positive reaction to the new AutoCAD 2000 design environment, particularly the enthusiasm for the software's 3D tools, signals that AutoCAD users are ready for a more fully integrated 2D-3D design environment, so long as it is in a format those users are familiar and comfortable with. Autodesk should be able to introduce even more advanced 3D functionality into the product in the future because of users' high level of trust in and satisfaction with AutoCAD.

Interestingly, Autodesk faces some difficulty convincing very satisfied AutoCAD Release 14 users to upgrade immediately to AutoCAD 2000. Communicating the advantages of upgrading is therefore a priority. Competitive advantage may be the most compelling reason for many to make this move, as AutoCAD Release 14 users who hear about the improvements in the design environment will come to feel that competitors who have upgraded to AutoCAD 2000 have a real edge over them.

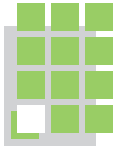
Making the improvements suggested by current users will help Autodesk cement AutoCAD 2000 software's standing as a breakthrough product and make upgrading an even more compelling message. A subsequent release that addresses ADI accessibility and transportable toolbars will also reach those users who dislike adopting the first release of any new software product. Such a move is bound to generate positive word-of-mouth, always a strong selling force.

In introducing enhanced connectivity/interoperability features, Autodesk is slightly ahead of the market. Daratech believes Autodesk is helping to accelerate this evolution by putting the clout of AutoCAD behind connectivity—many users will engage connectivity tools as part of AutoCAD, and their desire not to miss out on a large part of cutting-edge AutoCAD functionality will put infrastructure and workflow changes higher on their agendas. Autodesk should therefore continue to communicate to the marketplace the benefits of connectivity, and the ways AutoCAD 2000 can help users realize these benefits.

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